

Sub
a1

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25

CLAIMS:

1. A method for concealing an information pattern of multiple discrete values within a digital signal, the method comprising:

receiving the information pattern of multiple discrete values;

chessboarding the discrete values of the information pattern to produce chessboarded discrete values.

2. A method as recited in claim 1 further comprising encoding the chessboarded discrete values into the digital signal, wherein such signal is noise in relation to the information pattern.

3. A method as recited in claim 1, wherein the chessboarding comprises: pseudorandomly determining whether to change each discrete value of the information pattern, wherein such determining is based upon a pseudorandom number generator (PRNG) and a key;

changing each discrete value of the information pattern that the determining indicates should be changed, thereby producing chessboarded discrete values.

4. A method as recited in claim 1, wherein the chessboarding comprises: pseudorandomly determining whether to change each discrete value of the information pattern, wherein such determining is based upon a look-up table;

changing each discrete value of the information pattern that the determining indicates should be changed, thereby producing chessboarded discrete values.

00644660-04200

1 5. A method as recited in claim 1, wherein the chessboarded discrete
2 values are entropy-balanced.

3
4 6. A method as recited in claim 1, wherein the chessboarded discrete
5 values are absolutely chessboarded.

6
7 7. A method as recited in claim 1, wherein the digital signal is an digital
8 audio signal.

9
10 8. A computer-readable medium having computer-executable
11 instructions that, when executed by a computer, performs the method as recited in
12 claim 1.

13
14 9. A method for revealing an information pattern of multiple
15 chessboarded discrete values within a digital signal, wherein the chessboarded
16 discrete values correspond to original discrete values of the information pattern
17 before the values were chessboarded, the method comprising:

18 receiving the information pattern of multiple chessboarded discrete values;
19 un-chessboarding the chessboarded discrete values to produce the original
20 values of the information pattern.
21
22
23
24
25

1 **10.** A method as recited in claim 9 further comprising detecting the
2 original discrete values encoded in the digital signal, wherein such signal is noise
3 in relation to the information pattern.
4

5 **11.** A method as recited in claim 9, wherein the un-chessboarding
6 comprises:
7

8 pseudorandomly determining whether to change each chessboarded discrete
9 value of the information pattern, wherein such determining is based upon a
10 pseudorandom number generator (PRNG) and a key;
11

12 changing each chessboarded discrete value of the information pattern that
13 the determining indicates should be changed, thereby producing the original
14 discrete values of the information pattern.
15

16 **12.** A method as recited in claim 11, wherein the key of the un-
17 chessboarding is identical to a key used to generate the chessboarded discrete
18 values from the original discrete values.
19
20
21
22
23
24
25

1 13. A method as recited in claim 9, wherein the un-chessboarding
2 comprises:

3 pseudorandomly determining whether to change each chessboarded discrete
4 value of the information pattern, wherein such determining is based upon a look-
5 up table;

6 changing each chessboarded discrete value of the information pattern that
7 the determining indicates should be changed, thereby producing the original
8 discrete values of the information pattern.

9
10 14. A method as recited in claim 9, wherein the chessboarded discrete
11 values are entropy-balanced.

12
13 15. A method as recited in claim 9, wherein the chessboarded discrete
14 values are absolutely chessboarded.

15
16 16. A method as recited in claim 9, wherein the digital signal is an
17 digital audio signal.

18
19 17. A computer-readable medium having computer-executable
20 instructions that, when executed by a computer, performs the method as recited in
21 claim 9.

1 **18.** A computer-readable medium having computer-executable
2 instructions that, when executed by a computer, perform a method for concealing
3 an information pattern of multiple discrete values within a digital signal, the
4 method comprising:

5 receiving the information pattern of multiple discrete values;

6 chessboarding the discrete values of the information pattern to produce
7 chessboarded discrete values;

8 encoding the chessboarded discrete values into the digital signal, wherein
9 such signal is noise in relation to the information pattern.
10

11 **19.** A computer-readable medium having computer-executable
12 instructions that, when executed by a computer, perform a method for revealing an
13 information pattern of multiple chessboarded discrete values within a digital
14 signal, wherein the chessboarded discrete values correspond to original discrete
15 values of the information pattern before the values were chessboarded, the method
16 comprising:

17 receiving the information pattern of multiple chessboarded discrete values;

18 un-chessboarding the chessboarded discrete values to produce the original
19 values of the information pattern;

20 detecting the original discrete values encoded in the digital signal, wherein
21 such signal is noise in relation to the information pattern.
22
23
24
25

1 20. An apparatus comprising:

2 a processor;

3 a chessboarder executable on the processor to:

4 receive an information pattern of multiple discrete values;

5 chessboard the discrete values of the information pattern to produce
6 chessboarded discrete values.

7
8 21. An apparatus comprising:

9 a processor;

10 an un-chessboarder executable on the processor to:

11 receive an information pattern of multiple chessboarded discrete
12 values;

13 un-chessboard the chessboarded discrete values to produce original
14 values of the information pattern.
15
16
17
18
19
20
21
22
23
24
25

1 **22.** An information pattern encoding system for concealing an
2 information pattern of multiple discrete values within a digital signal, wherein
3 such signal is noise in relation to the information pattern, the system comprising:

4 a receiver for receiving the information pattern of multiple discrete values
5 and the digital signal;

6 a chessboarder coupled to such receiver, the chessboarder chessboards the
7 discrete values received from the receiver to produce chessboarded discrete
8 values;

9 an encoder coupled to the receiver and the chessboarder, the encoder inserts
10 the chessboarded discrete values received from the chessboarder into the digital
11 signal received from the receiver.
12

13 **23.** An encoding system as recited in claim 22, wherein the
14 chessboarder comprises:

15 a pseudorandom number generator (PRNG) for pseudorandomly
16 determining whether to change each discrete value of the information pattern;

17 a value-adjuster to change each discrete value of the information pattern
18 that the PRNG indicates should be changed, thereby producing chessboarded
19 discrete values.
20
21
22
23
24
25

1 **24.** An encoding system as recited in claim 22, wherein the
2 chessboarder comprises:

3 a look-up table data structure for pseudorandomly determining whether to
4 change each discrete value of the information pattern;

5 a value-adjuster to change each discrete value of the information pattern
6 that the data structure indicates should be changed, thereby producing
7 chessboarded discrete values.

8
9 **25.** An encoding system as recited in claim 22, wherein the
10 chessboarded discrete values are entropy-balanced.

11
12 **26.** An encoding system as recited in claim 22, wherein the digital
13 signal is a digital audio signal.

14
15 **27.** An operating system comprising an encoding system as recited in
16 claim 22.
17
18
19
20
21
22
23
24
25

1 **28.** A marked signal with an information pattern of multiple
2 chessboarded discrete values encoded therein, the marked signal generated in
3 accordance with the following acts:

4 receiving an information pattern of multiple discrete values and an
5 unmarked signal;

6 chessboarding the discrete values of the information pattern to produce
7 chessboarded discrete values of the information pattern;

8 encoding the chessboarded discrete values into the unmarked signal to
9 produce the marked signal, wherein such unmarked signal is noise in relation to
10 the information pattern.

11
12 **29.** A marked signal as recited in claim 28, wherein the chessboarding
13 comprises:

14 pseudorandomly determining whether to change each discrete value of the
15 information pattern, wherein such determining is based upon a pseudorandom
16 number generator (PRNG) and a key;

17 changing each discrete value of the information pattern that the determining
18 indicates should be changed, thereby producing chessboarded discrete values.
19
20
21
22
23
24
25

1 **30.** A marked signal as recited in claim 28, wherein the chessboarding
2 comprises:

3 pseudorandomly determining whether to change each discrete value of the
4 information pattern, wherein such determining is based upon a look-up table;
5 changing each discrete value of the information pattern that the determining
6 indicates should be changed, thereby producing chessboarded discrete values.

7
8 **31.** A marked signal as recited in claim 28, wherein the chessboarded
9 discrete values are entropy-balanced.

10
11 **32.** A marked signal as recited in claim 28, wherein the chessboarded
12 discrete values are absolutely chessboarded.

13
14 **33.** A marked signal as recited in claim 28, wherein the marked and
15 unmarked signals are digital audio signals.

16
17 **34.** A method for encoding values within a digital audio signal, the
18 method comprising:

19 receiving the digital audio signal having frequency magnitude components;
20 analyzing the relative energy levels of the frequency magnitude
21 components of the signal;

22 determining whether the signal has a large discrepancy in the relative
23 energy levels of the frequency magnitude components.
24
25

1 35. A method as recited in claim 34 further comprising if the signal has
2 no large discrepancy in the relative energy levels of the frequency magnitude
3 components, then encoding at least one value into the signal.
4

5 36. A method as recited in claim 34 further comprising if the signal has
6 a large discrepancy in the relative energy levels of the frequency magnitude
7 components, then skipping encoding values into the signal.
8

9 37. A computer-readable medium having computer-executable
10 instructions that, when executed by a computer, perform a method for encoding
11 values within a digital audio signal, the method comprising:
12

13 receiving the digital audio signal having frequency magnitude components;

14 analyzing the relative energy levels of the frequency magnitude
15 components of the signal;

16 determining whether the signal has a large discrepancy in the relative
17 energy levels of the frequency magnitude components.
18
19
20
21
22
23
24
25

1 **38.** A watermark encoding system for encoding bits of a digital
2 watermark within a digital audio signal having frequency magnitude components,
3 the system comprising:

4 an analyzer to examine the relative energy levels of the frequency
5 magnitude components of the signal and determine whether the signal has a large
6 discrepancy in the relative energy levels of the frequency magnitude components;

7 an encoder coupled to the analyzer, the encoder is configured to insert at
8 least one bit of the digital watermark into the digital signal.

9
10 **39.** A system as recited in claim 38, wherein the encoder inserts at least
11 one bit of the digital watermark into the digital signal if the analyzer determines
12 that the signal has no large discrepancy in the relative energy levels of the
13 frequency magnitude components.

14
15 **40.** A system as recited in claim 38, wherein the encoder does not insert
16 a bit of the digital watermark into the digital signal if the analyzer determines that
17 the signal has a large discrepancy in the relative energy levels of the frequency
18 magnitude components.
19
20
21
22
23
24
25

1 **41.** A method for encoding a watermark within a audio signal, the signal
2 having a starting point, the method comprising:

3 calculating a variable amount of time;

4 after that variable amount of time after the starting point of the signal,
5 encoding a watermark into the signal.
6

7 **42.** A method as recited in claim 41, wherein the calculating comprises
8 pseudorandomly determining the variable amount of time, wherein such
9 determining is based upon a pseudorandom number generator (PRNG) and a key.
10

11 **43.** A computer-readable medium having computer-executable
12 instructions that, when executed by a computer, perform a method for encoding a
13 watermark within a audio signal, the signal having a starting point, the method
14 comprising:

15 calculating a variable amount of time;

16 after that variable amount of time after the starting point of the signal,
17 initiating encoding a watermark into the signal.
18

19 **44.** A method for detecting a watermark within a audio signal, the signal
20 having a starting point, the method comprising:

21 calculating a variable amount of time;

22 after that variable amount of time after the starting point of the signal,
23 initiating detection of a watermark in the signal.
24
25

1 **45.** A method as recited in claim 44, wherein the calculating comprises
2 pseudorandomly determining the variable amount of time, wherein such
3 determining is based upon a pseudorandom number generator (PRNG) and a key.
4

5 **46.** A method as recited in claim 45, wherein the key is identical to a
6 key used to determine when to initiate encoding of the watermark in the signal.
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25